which have been suggested, and which are here quoted, for determining the radius of the star image, or deriving the photographic magnitude, were admittedly only convenient methods of interpolation, and any attempt to show that such formulæ possess a physical basis is of doubtful policy, and will hardly be everywhere accepted; but the practical value of the chapter is high, and gains immensely from the fact that the author incorporates much of the results of his own original investigations.

In the history of photography we come naturally upon more popular ground. We have an instructive, and on the whole complete, picture of the achievements of photography applied to the heavens. The section treats each object, such as the moon, the sun, &c., separately, the history of each being treated independently of the others. The later results obtained from recent eclipse expeditions are of course wanting, and possibly a little too much space is given to the Transit of Venus. The photographic reproductions that illustrate this section are excellent, and make a handsome addition to a very valuable treatise. A bibliography accompanies the work, which already needs extension, so frequent are the contributions to this attractive development of astronomy.

OUR BOOK SHELF.

Euclid's Elements of Geometry. By Charles Smith and Sophie Bryant. Pp. vi+127. (London: Macmillan and Co., Ltd., 1899.)

THIS book deals only with Euclid's Books III. and IV. Although the original order of the propositions has been maintained, there are many divergences as regards the treatment of his methods. In the modern teaching of Euclid's propositions the student is not so restricted as to particular methods of solution as long as the method he employs is accurate. The learning of propositions by heart is, we hope, a relic of the past, and the compilers of this work encourage the ingenuity of the student. In Book III. the method of superposition is used with advantage. In addition to numerous exercises, the appendix contains many interesting and important theorems and problems. As a school course this edition should be found useful.

A First Book in Statics and Dynamics. By Rev. J. R. Robinson. Pp. viii+98. (Longmans, Green and Co., 1899.)

THIS book is intended only for beginners, and specially for those who are preparing for the matriculation in the University of London and for the elementary stage of South Kensington examination. For this reason only a limited knowledge of Euclid, algebra and trigonometry is assumed in the treatment of the subject, and the text is accompanied by numerous representative examples. The author's large experience in teaching the subject has enabled him to place clearly before his readers portions which are usually stumbling-blocks for the beginner, and the numerous clearly-printed diagrams add greatly to the explanations in the text.

Life and Happiness. By Auguste Marrot. Pp. 90. (London: Kegan Paul, Trench, Trübner and Co., Ltd. Paris: Libraire Fischbacher.)

HAPPINESS is too much a matter of temperament for the perusal of these chatty little essays on the laws of health, the development of the mind, and similar subjects, to very much affect the reader's share of this desirable possession. But there can be very little doubt that the observance of some of the rules for the preservation of health here laid down will do a great deal in removing definite causes of physical discomfort—and in this way unhappiness may, at least, be diminished.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

On the Carriers in the Kathode Rays.

IN a former communication to these columns of NATURE (January 19, 1899), I showed that an upper limit for the density of the matter composing the kathode rays can be deduced from the fact that a shaft of rays emitted from a plane kathode retains its cylindrical form. The result arrived at was that the density must be small compared with 10^{-15} grams per cubic centimetre. In a subsequent note (February 16), I called attention to some results of E. Riecke, which seemed to indicate a value as low as 10^{-20} grams per cubic centimetre.

The researches of Prof. J. J. Thomson have now put us in possession of information as to the mass of the individual carriers. Using the value which he has given (*Phil. Mag.* December 1899) for the mass of a "corpuscle" in connection with the above estimate of the density of the stream, we can obtain a limiting value for the number of corpuscles per cubic centimetre. I find that this leads to a number very much smaller than that indicated by the kinetic theory for the average number of molecules per cubic centimetre in the vacuum tube.

We have, in round numbers, 2×10^{-20} for the charge on a corpuscle in electromagnetic units, and 6×10^6 for the ratio of charge to mass, giving $\frac{1}{3} \times 10^{-26}$ grams for the mass. If then, the density is small compared with 10^{-15} grams per cubic centimetre, the number per cubic centimetre must be small compared with 3×10^{11}. In Meyer's "Kinetic Theory of Gases" (English translation, p. 333) the number of molecules present in a cubic centimetre of gas at atmospheric pressure is given as 60×10^{18}, so that in the vacuum tube the number would be of the order of 10^{16}. Thus the carriers in the kathode stream are very sparsely scattered as compared with this average.

Another point which may be worth mentioning arises in connection with Prof. Thomson's suggestion, that the mass of the corpuscle may be of electrical origin. He shows (*loc. cit.*, p. 563) that, in order to account for the effective mass in this way, the radius of the corpuscle, supposed spherical, would require to be of order 10^{-13} centimetre. The various lines of argument employed to arrive at an estimate of the size of a *molecule*, or of the "molecular sphere," agree in making its dimensions comparable with 10^{-7} centimetre. In order that a molecule of this size should be built up of, say, two atoms, each consisting of a complex of even a thousand corpuscles of radius 10^{-13} centimetre, these ultimate elements of a molecular structure would require to be very widely spaced in proportion to their dimensions. W. B. MORTON.

Queen's College, Belfast, February 6.

Drunkenness and the Weather.

NATURE, in its issue for November 16 (1899), did me the honour of devoting considerable space to a modest publication of mine, "Conduct and the Weather," a fact to which I feel free to allude, since the reviewer found so little to praise. One remark of his, however, was suggestive to one "bound hand and foot by the demon of statistics." In commenting upon the indicated excesses of arrests for assault and battery during the hot summer months he says, "In our own ignorance we were rather tempted to attribute these lapses of good conduct to too free indulgence in alcoholic beverages in the hot weather." Here was a cue worth following out. The data were available, why not use them?

The plan followed was the same that found so little merit in the eyes of the jocular reviewer, but even at the risk of tempting him to again couch his lance, I shall outline it somewhat in detail. The general plan is that of comparing the normal daily prevalence of any abnormality of conduct with its prevalence under definite weather conditions. It necessitates a daily record of the crime to be studied, and some daily record of the weather conditions.

In the study of drunkenness, the data were taken from the records of the New York City Police Force. From them were copied the exact number of arrests for that crime for each one of the 1095 days of the three years 1893-94-95; 44,495 in all (males). The necessary meteorological data were obtained at

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the New York City Station of the United States Weather Bureau. There were copied the mean temperature, barometer and humidity, the total movement of the wind, the character of the day and the precipitation for each of the days of those same three years. Then, by a somewhat laborious process of tabulation, excesses or deficiencies in the occurrence of arrest for drunkenness were determined. In the accompanying diagrams these are shown for the different months of the year, and for definite conditions of temperature. In each, the heavy horizontal line represents the normal occurrence, distances along the abscissa line the months of the year and definite temperature groups, while ordinate distances show excesses or deficiencies in percentages of the expectancy. The extremes of the temperature curve are omitted where the probable error equalled or exceeded the discrepancy in occurrence.

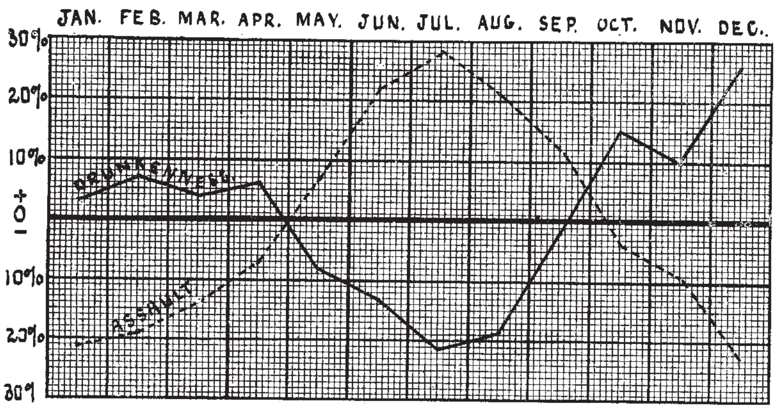

FIG 1.

As may be seen from both of the diagrams, the surmise of the reviewer with respect to the use of intoxicants is erroneous. In fact, their showing is somewhat surprising. As shown by Fig. 1, the prevalence of intoxication during the cold months is much in excess of that for the warm ones, December giving the police-court 47 per cent. more business from its use than did July. The physiological problem which this fact might suggest, as to the effect of equal quantities of alcohol taken under different conditions of temperature, I do not here attempt. If there is not a marked difference in this respect, our figures would indicate that much more liquor was drunk in the City of New York during the colder months of the years studied than during those of the other extreme of temperature. We claim no broader bearing for the problem ; but even this is interesting.

The difference might be due either to social or meteorological influences. Under the first we may consider the effect which certain holidays might have upon the prevalence of drunkenness. Undoubtedly some days of the year are made the occasion of a drunken debauch by persons so inclined, and Christmas is one of them. But the 4th of July is perhaps just as much of a favourite for such diversion to us in America, a fact which would swell the numbers for that month. This, however, fails to show any such effect. In fact, a careful inspection of the record, although showing a slight increase of drunkenness for the festivals mentioned, proves it to be too small to account for the monthly showing. The excesses for the cold months are due to a large daily occurrence, and the deficiencies for the cold ones to the reverse conditions.

Another social condition which might effect the results is the exit from the city for the summer of some who are brought with some regularity before the bar of the police-court during the rest of the year. My study of assault and battery would, however, lead me to believe that the influence of this exodus is not great. It would be reasonable to infer that arrests for these crimes and for drunkenness would, for the most part, be made from the same social stratum, and that social conditions which would influence the prevalence of one would have the same effect upon the other. That is, if public drunkards were gone in any numbers from the city, public brawlers would be also. Yet this is precisely the reverse of what our study of assault has shown. Upon Fig. 1 I have shown, by means of a dotted curve, the arrests for this crime for the same years. It shows as marked excesses for the warm months as we have deficiencies for drunkenness for that season, a fact which would lessen the validity, if not entirely negative the weight of any migration theory which might be brought to bear upon the problem.

The third hypothesis is that of the direct effect of the peculiar meteorological conditions, and it seems to be the most plausible. Of these, temperature is the only one which we shall here consider. As shown by Fig. 2, the relation between expectancy and occurrence was worked out for each of the temperature groups indicated at the top, and represented by the curve. Low temperatures made business for the police judge, and high ones lessened his labours. Of course, if our conclusions in the preceding paragraph on occurrence were erroneous, those from this figure would be also. In that case, deficiencies for high temperatures shown here would be but concomitant variations.

The summer is hot. If there be but few arrests for drunkenness during the summer, there can be but few during high temperatures. On the other hand, if high temperatures so affect the individual that less stimulant is demanded than during those which are lower, we have here the cause of the peculiarities shown in Fig. 1. There are many reasons for believing that this is the case. In the first place, there is every reason to believe that the vitality of the body is lower in cold weather than during that which is moderately warm. This in itself would influence the demand for stimulant. A "wee drappie" is taken when *needed*, and for many this means a drunk. No doubt many of the *habitués* of the police-court as prisoners struggle against their tendencies to drink, knowing the consequences. When vitality is great, they do so with success. For days, and perhaps weeks, they are winners, but the time comes when the fight is too severe, and they succumb. That was on the day when vitality was at its lowest ebb, and the cold contributed to that condition. The poor fellow was cold ; he was weak. The stimulant would give him immediate though temporary relief. He took it, and our figure shows the result.

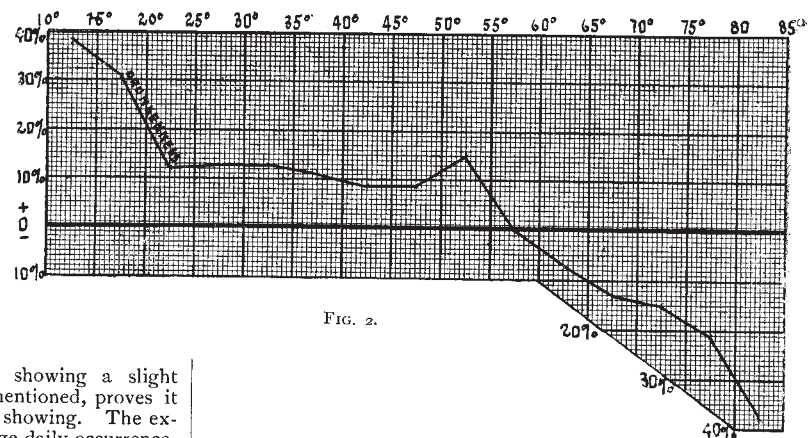

FIG. 2.

In conclusion, I would say that I recognise the limitations of this method of study. By its very nature, each meteorological condition is treated as if the others were not at the same time present. This would, however, introduce no error unless two or three tended to vary concomitantly. In that case, the effects of one might be imputed to another. We recognise, too, that a study of drunkenness does not have quite the bearing

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upon the drink problem that one based upon the consumption of liquor would have, but perhaps is not entirely without value. It certainly is not if it tends in the slightest way to throw the temperance problem into the hands of social reformers. Better heated tenements, warmer overcoats, and more nourishing food may have more to do with it than we think.

EDWIN G. DEXTER.

IF the writer of the notice, by any remarks of his, has given annoyance to Prof. Dexter, whose industry and careful compilation of facts have never been called into question, he would greatly regret it. But in so far as that notice has been the means of procuring from the author a most interesting letter, he can only congratulate himself.

One might call attention to many significant conclusions that could be drawn from Prof. Dexter's curves; but perhaps the most prominent is that, apparently, the greatest number of assaults are committed when the populace is the most sober. This is an entirely unexpected conclusion. In this country, we have been repeatedly told that drunkenness is the main cause of crime, especially of crimes directed against the person; and yet a careful elaboration of statistics, compiled by an eminent authority, completely demonstrates the fallacy of such an argument when applied to the City of New York.

THE WRITER OF THE NOTICE.

Deceptive Bibliographic Indications.

AUTHORS' reprints of scientific papers are indeed a boon to the worker in science, especially to him who is distant from a large library. But their usefulness to the recipient who is himself a writer of works, and not a reader only, depends to a large extent on whether the reprints are or are not provided with correct and complete bibliographical indications of their origin. Occasionally one gets a reprint without date, with no reference to the original volume, page, and plate numbers, and even it may be without the name of the periodical from which it is an extract. But in the majority of reprints distributed nowadays, an attempt has been made to give the requisite information. Success is not often attained, it is true; still one is grateful for the good intention.

The imperfections hitherto mentioned are only too easily observed, and the task of making them good, though wearisome, is not impossible if one lives long enough. But among the reprints sent to me during the last two months are numerous instances of an error more difficult to detect, and more annoying in its results. To all appearance the reprints in question give the requisite bibliographic indications, their paging seems to be that of the original, and the type shows no signs of having been disturbed. But in each case one or more of these appearances is a specious falsehood. Here are some of the misstatements observed. A reprint paged 141–147 originally appeared on pp. 142–148. A paper that occurs on pp. 170–175 of the publishing society's *Bulletin* has had the type spaced out so that the pagination of the reprint is 170-176. A reprint has the original pagination carefully given in [ ] on each page, and runs from 367 to 370; the original pages were 367–371, and half of every page has been shifted to the preceding. Sometimes the wrapper of the reprint gives one set of numbers, while the pages themselves bear another set, each purporting to be the original.

The last case is not so objectionable, since it is clear there is a mistake somewhere. But in the other cases it is only by chance that one detects the error. Each seems trivial in itself, and a single instance hailing from some petty local club would be passed over with a laugh and a grumble. But examples have come to me alone, during a few weeks, from the publications of the German Geological Society, the Zoological Society of France, the Natural History Museum of Paris, the International "Congress of Zoology," the Geological Survey of Canada, and the *Geological Magazine*.

This contempt for veracity is chargeable to the printer, not the authors; and the remedy lies in the hands of the editor. If the editors of our scientific publications would but realise the perpetual inconvenience that is caused by a little want of thought, and would but give clear and definite instructions to their printers to place the required bibliographic indications at the head of each reprint, to retain original pagination, and never to shift the type without duly stating the fact—then the amount of time saved by the numerous workers who have to rely upon authors' copies would be far greater than most people have any idea of.

F. A. BATHER.

January 31.

Specific Heat of Marble.

IN 1898 we published, in the *Proceedings* of the American Academy of Arts and Sciences, a paper containing a discussion of certain mathematical problems arising in the study of the flow of heat in prisms, together with an account of an investigation of the conductivities of a number of specimens of glass and of marble.

In this paper we called attention to two groups of fine-grained marbles, which have conductivities (nearly independent of the temperature within wide limits) of 0·0068 and 0·0076 respectively, while Carrara Statuary marble and many of the British marbles—as Messrs. Herschel, Lebour and Dunn have shown—have conductivities of only 0·0051.

Within a few weeks we have found time to determine the specific heats of all our marble blocks, and have obtained the results given in the table which follows.

These specimens, each of which is described in our former paper, had been lying untouched in the warmed laboratory for about ten months, and were, therefore, neither abnormally moist nor abnormally dry.

Variety of Marble.	Sp. Gr.	Conductivity.	Average sp. ht. between 25° C. and 100° C.	Sp. ht. per unit volume.
"Carrara Statuary"	2·72	0·00501	0·213	0·579
" "		0·00509		
"Mexican Onyx"	2·71	0·00556	0·211	0·572
"Vermont Statuary"	2·71	0·00578	0·210	0·569
"American White"	2·72	0·00596	0·214	0·582
"Egyptian"	2·74	0·00623	0·212	0·581
"Sienna"	2·68	0·00676	0·215	0·576
"Bardiglio"	2·69	0·00680	0·218	0·586
"Vermont Cloudy White"	2·75	0·00681	0·210	0·578
"Vermont Dove Coloured"	2·74	0·00684	0·208	0·570
"Lisbon"	2·75	0·00685	0·211	0·580
"American Black"	2·68	0·00685	0·214	0·574
"Belgian"	2·75	0·00755	0·206	0·567
"African Rose Ivory"	2·75	0·00756	0·212	0·583
"Tennessee Fossiliferous"	2·71	0·00756	0·214	0·580
"Knoxville Pink"	2·73	0·00757	0·212	0·579
"St. Baume"	2·70	0·00761	0·210	0·567

The results of twenty-two determinations made between different temperature limits with a number of pieces of Carrara Statuary marble artificially dried at a temperature a little above 100° C. are well represented by the following formula

$$Q = 0{\cdot}1848(t-25) + 0{\cdot}00019(t-25)^2,$$

in which Q represents the amount of heat in calories required to raise one gramme of this *dry* marble from 25° C. to the temperature t.

Jefferson Physical Laboratory, Harvard University, U.S.A. B. O. PEIRCE. ROBERT W. WILLSON.

The Coccidæ of New Zealand.

MR. H. FARQUHAR, in your issue of January 11, p. 247, has some interesting remarks on the Coccidæ of New Zealand, which, however, need to be slightly modified in the light of recent researches. The genera of Coccidæ peculiar to New Zealand are as follows:—

(1) *Phenacoleachia*, Ckll. (type *Leachia zealandica*, Maskell). One species. This is an extremely distinct genus, and may be regarded as the type of a distinct subfamily (Phenacoleachiinæ), differing from the Coccinæ by the compound eyes of the male, wherein it is allied to the Ortheziinæ.

(2) *Coelostomidia*, new name (*Coelostoma*, Maskell, not of Brullé, 1835, nor *Coelostomus*, McLeay, 1825). Five species. All the supposed species of *Coelostomidia* found in Australia belong to *Callipappus*.

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